

ELECTRONIC APPARATUS

[0001] This application claims priority to prior application JP 2005-028505, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] This invention relates to an electronic apparatus, particularly, to improvement of an electronic apparatus which is configured so that a flat vibrating body (e.g. a touch panel) is vibrated by a vibrating element(s).

[0003] A touch panel is well known as an input device for an electronic apparatus. A type of the touch panel provides a vibrating function to give operation feeling to an operator.

[0004] The touch panel having the vibrating function vibrates when its surface is pressed with a finger of the operator, a stylus held by the operator, or the like. The vibration of the touch panel is transmitted to the operator through his/her finger or the like. Thus, the operator perceives whether input operation executed by the operator is accepted by the electronic apparatus or not.

[0005] A conventional electronic apparatus having the touch panel with the vibration function uses a single type of supporting members to fix the touch panel to a main body (or a supporting frame) and to support the touch panel against the main body. The supporting members are made of material which has flexibility and which hardly absorbs the vibration of the touch panel.

[0006] As mentioned above, in the conventional electronic apparatus, the touch panel is fixed to the main body with the single type of the supporting members made of the material which has flexibility and which hardly absorbs the vibration of the touch panel. Accordingly, the vibration of the touch panel is transmitted to the main body through the supporting members. It is possible that the vibration exercises a harmful influence on components (e.g. a liquid crystal display unit) and circuits housed in the main body.

[0007] Thus, the conventional electronic apparatus has a problem that the vibration of the touch panel is transmitted to the main body.

[0008] Such an electronic apparatus is disclosed in Unexamined Japanese Patent Publication No. 2004-94389.

SUMMARY OF THE INVENTION

[0009] It is therefore an object of this invention to provide an electrical apparatus capable of preventing transmission of vibration from a flat vibrating body to components mounted on a chassis which supports the flat vibrating body.

[0010] Other objects of this invention will become clear as the description proceeds.

[0011] According to an aspect of this invention, an electronic apparatus includes a flat vibrating body and a chassis used for supporting the flat vibrating body. The electronic apparatus comprises fixing cushions which are fixed to the flat vibrating body. Vibration absorbing cushions are fixed to the chassis. A fixing frame is disposed between the flat vibrating body and chassis and fixed to both the fixing cushions and the vibration absorbing cushions.

[0012] In the electronic apparatus, the fixing cushions and the vibration absorbing cushions may have slender shapes and be disposed parallel to one another.

[0013] The flat vibrating body may have a rectangular shape with pair of edges parallel to each other. In this case, the fixing cushions may be arranged along the edges.

[0014] The electronic apparatus may comprise pair of vibrating elements fixed to the flat vibrating body along different pair of edges of the flat vibrating body.

[0015] In the electronic apparatus, the flat vibrating body may be a touch panel.

[0016] The electronic apparatus may have a liquid crystal display panel mounted on the chassis.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a perspective view of an electronic apparatus according to a first embodiment of this invention;

[0018] FIG. 2 is an exploded perspective view of the electronic apparatus of FIG. 1;

[0019] FIG. 3 is a schematic diagram for describing a vibrating state of a touch panel included in the electronic apparatus of FIG. 1;

[0020] FIG. 4A is a schematic plane view showing a variation of the electronic apparatus of the first embodiment;

[0021] FIG. 4B is a schematic side view of the electronic apparatus of FIG. 4A;

[0022] FIG. 5 is a perspective view of an electronic apparatus according to a second embodiment of this invention;

[0023] FIG. 6 is an exploded perspective view of a display and touch panel portion included in the electronic apparatus of FIG. 5; and

[0024] FIG. 7 is a partly sectional view taken along a line VII-VII of 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Referring to FIGS. 1 to 3, a description will be directed to an electronic apparatus according to a first embodiment of this invention.

[0026] FIG. 1 is a perspective view of the electronic apparatus (or a panel assembly) of the first embodiment while FIG. 2 is an exploded perspective view thereof.

[0027] The electronic apparatus includes a rectangular touch panel (or a flat vibrating body) 11 having a glass or resinous substrate at a rear side thereof. On a rear surface of the touch panel 11, pair of vibrating elements 12 are fixed along upper (or rear side of FIG. 2) and lower (or front side of FIG. 2) edges of the touch panel 11. The rear surface of the touch panel 11 corresponds to an exposed surface of the glass or resinous substrate. Further, on the rear surface of the touch panel 11, pair of fixing cushions 13 are fixed along right and left edges of the touch panel 11. A fixing frame 14 has a frame or rectangular shape, which is nearly equal to or slightly larger than the touch panel 11 in length and breadth, to support the touch panel through the fixing cushions 13. Pair of vibration absorbing members 15 are fixed on a rear